Cleaning and Painting of Structural Steel

Contents

Cleaning and painting of structural steel bridges is a vital, specialized phase of bridge construction and maintenance.

Structure Representatives are responsible for verifying the satisfactory completion of cleaning and painting work in accordance with the *Contract Specifications*.

The following information on cleaning and painting methods, procedures and precautions, paint material, inspection techniques and record keeping, is intended to provide Structure Representatives and their assistants with a rudimentary knowledge of paint inspection, and cleaning and painting of structural steel bridges. Any specific instructions in the *Contract Specifications* will supersede or modify these instructions.

1 – Purpose of Painting

The paint on structural steel may be described as a relatively impervious barrier imposed between the steel surface and its environment. Paint retards the corrosion of the steel. Corrosion may manifest itself in many forms, and it may have many causes, but the effect is always the same: metal is consumed or deteriorated.

Paint or the coating system, then, may be considered a low-cost renewable or repairable shield or membrane which acts as a moisture barrier to the environment to protect the metal. The service life expectancy of the coating system in California as affected by climatic conditions, is illustrated by Figure 3, *Paint Service Life on Structural Steel Bridges.*

The service life of the coating system is also a function of the surface preparation, degree or levels of cleanliness, and application of the coating. The coating must be properly formulated and prepared from components having certain necessary properties. It must be properly applied to clean steel surfaces, and the completed dry film must have adequate thickness. Shortcomings in any of these requirements result in a decreased service life of coatings. In California, atmospheric conditions affecting the service life of coatings vary between two extremes: the saline humidity of the seacoast and the hot aridity of the desert. Between these two extremes are regions where milder weather conditions prevail. The need for protection is considerably less under mild exposure than it is under severe exposure. The coating system specified is therefore designed to meet the needs of the area and conform to the latest air quality regulations imposed on the solvent content of paint materials.

Current Department specified coating systems are either a water-borne, moisture cure, or inorganic zinc.

Due to air quality regulations in certain regions of the state, a coating system consisting of water-borne primers and topcoats has been developed by the Department's chemistry lab at Materials Engineering and Testing Services (METS). This system consists of two undercoats and two finish coats, applied in two or more applications.

Water-borne coatings generally require higher temperatures and lower relative humidity than some other coatings to cure properly. Check the historical data available for the region where the paint system is to be applied. Consider the coating system initially selected during the constructability review stage for compatibility with the regional weather conditions and the intended construction schedule.

The specification of multiple coating applications and the minimum dry film thicknesses of the coating system has evolved. Most coatings used on structural steel contain varying amounts of volatile solvents which, when they evaporate during the curing process, leave minute holes in the paint film. The application of multiple coatings, not too thin or too thick, tends to overcome the adverse pin-hole pattern in each coat and assures a truly impervious membrane.

Most coatings will not tolerate extra thick applications or puddles. If too much coating is applied, or puddles of the material are left on the surface, the coating will crack and lose bond with the steel or underlying coat. Each application should be held to near the amount specified.

2 – Surface Preparation

The most important factor affecting the protective service life of a coating is the surface preparation prior to application of the coating. The best coating available will not give optimum service when applied over improperly cleaned surfaces. It is essential, therefore, that the coating is applied only to clean, sound, dry, and properly prepared surfaces.

Although several methods of surface preparation are employed in the painting industry, it has been found that solvent cleaning (SP-1) and blast cleaning (SP-6) are the most effective and least expensive methods. These two methods are specified almost exclusively. Occasionally, in mild exposure areas or where the type and amount of rust does not warrant the expense of blast-cleaning, power tool cleaning methods may be allowed by the specification. The Society for Protective Coatings (SSPC) has specifications that address the different levels of surface preparation including the following:

SP-1 Solvent Cleaning

SP-2 Hand Tool Cleaning

SP-3 Power Tool Cleaning

SP-6 Commercial Blast Cleaning

SP-10 Near-White Metal Blast Cleaning

Blast-cleaning is simply the propulsion of an abrasive against an object, and the cleaning is accomplished by the abrasive action. Wet blast-cleaning methods may be specified for personal protection measures due to high concentrations of heavy metals in the existing coating system.

Abrasives obtained from commercial sources generally meets Department requirements. Use of unwashed beach or river sand is not permitted because contaminants or too many fines are often present. It also does not meet Air Resource Board requirements and newer silica dust requirements.

Most often the abrasives used are steel shot, steel grit and slag from copper, nickel, and silver smelting processes. The use of steel shot or steel grit is usually limited to shop blasting where recovery for reuse is possible. High initial cost and lack of a practical recovery method prohibit the use of these abrasives in the field. Mineral and slag abrasives must comply with SSPC-AB 1 Class A, Grade 2 to 3. Steel abrasives must comply with SSPC-AB 3. Recycled steel abrasives must comply with SSPC-AB 2. In the field, the use of metal abrasives requires additional care after blasting for removal from crevices in the steel connections and to prevent loose particles from falling and coming to rest onto the surfaces below and causing corrosion stains.

Solvent cleaning can be performed by methods including but not limited to pressure washing, or steam cleaning. Pressure washing consists of washing the surface to be coated with a pressure wash system consisting of pressures ranging from 2,500 to 5,000 psi at the nozzle applied directly to the surface to be cleaned. The pressure can be derived from the pressure wash system's gallons per minute (gpm) ratings. Some machines have adjustable pressures with gauges attached. The water is directed against the surface, and the contaminants are loosened and carried away by the water. Any residue remaining on pressure washed surfaces should be rinsed before painting. Steam cleaning uses high temperature steam to remove contaminants from the surface.

Pressure washing is almost always used in lieu of steam cleaning. The primary purpose of steam cleaning or pressure washing is to remove surface contaminants which would hinder the bonding of the new to existing coating system. Steam cleaning is often specified on overhead painting projects to remove railroad soot from the existing structure. Pressure washing will remove some loose rust from the surface. Any remaining rust that will hinder bonding of the new coating system after steam cleaning or pressure washing will generally be followed by spot abrasive blast-cleaning.

An interval of at least 24 hours should elapse after pressure washing or steam cleaning, before the coating is applied.

3 – Caulking

Caulk is applied to all joints, seams, built-up sections, or open seams greater than 6 mils using an authorized sealing material after application of the undercoat. Verify that the application of this material does not create a condition where water can pond. The caulk needs to be cured prior to application of the finish coats.

4 – Mill Scale

Mill scale is a thin, hard, brittle layer of iron oxides that forms on the outer surface of hot rolled steel. It is more cathodic than the base steel to which it adheres. Mill scale expands and contracts at a different rate than base steel causing it to de-bond, resulting in cracking and flaking off the surface. Mill scale is cathodic (-0.2) to steel (-0.5 to -0.8) so in the presence of moisture, corrosion will form in the underlying steel. See Figure 1, *Galvanic Series of Selected Metals*, for the galvanic series of selected metals.

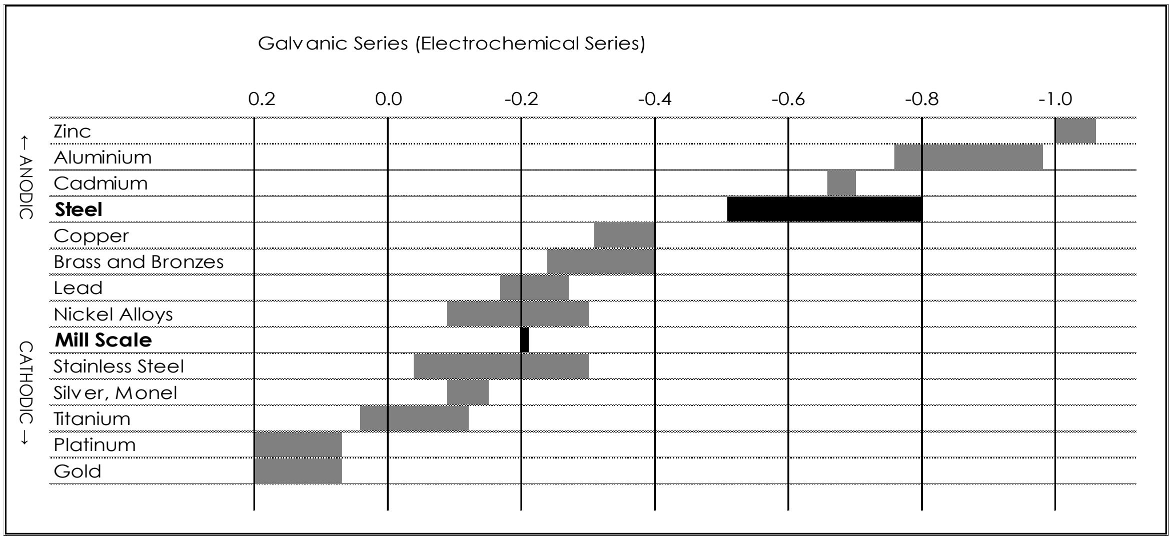

Figure 1. Galvanic Series of Selected Metals

Mill scale has been found on older structures. During cleaning, any loose mill scale that is encountered needs to be removed to prevent further corrosion. This may involve chasing the loose mill scale. Consult with the Bridge Construction Engineer and Structure Maintenance and Investigation (SM&I) Bridge Paint Program Advisor if large areas of mill scale are encountered.

SSPC Surface Preparation standards SP-6 and SP-10 both address mill scale. SP-6 specifies the removal of all visible mill scale whereas SP-10 specifies the removal of all mill scale. One of the main differences is in the amount of staining that is allowed to remain: SP-6 allows 33% versus 5% with SP-10.

5 – Coating System Application

The coatings specified generally consist of one or more undercoats. The various coats or layers are planned and specified:

1. To achieve an impervious membrane which inhibits corrosion.
2. To protect the steel against impact or abrasion.
3. To give the structure a pleasing appearance.

The normal functions of undercoats are to inhibit corrosion, to provide a suitable base for the finish coats, and to present a secondary barrier to any moisture penetrating the finish coats. A stripe coat is applied to all edges, corners, and other irregular surfaces such as bolts, prior to application of the undercoat. This is to ensure full coverage by the undercoat.

Finish coats comprise the tough outer layer of the paint film which is directly exposed to the weather. They are the weathering or wearing coats of a coating system and must, therefore, have a harder, more impervious surface than the undercoats. The finish coat must be compatible with the prime coat. Two applications of finish coat are normally specified.

The coating may be applied to structural steel by brush, roller, or spray, following the manufacturer’s recommendations. Regardless of the method used, care must be exercised in the application to achieve the maximum service-life of the coating system. It is the responsibility of the Structure Representative to verify that the Contractor applies the coating properly. The coating should be well mixed and uniformly applied, and any skips or holidays should be picked up before subsequent applications are allowed, since the smallest break or thin spot in the paint film is a potential trouble spot.

The conventional method uses air to atomize the paint at the nozzle. Jets of air break the paint at the nozzle into tiny droplets and carry it to the surface. Because the atomization of the paint can be adjusted at the nozzle, paint can be applied in varying pattern shapes. The paint can be controlled for spraying irregular shapes and corners. A typical conventional spray method setup includes an appropriately sized air compressor, air hose, fluid hose, moisture/oil extractor, pressure pot, and spray nozzle. Adjustments to the air and fluid lines are made at the pot and nozzle. These will regulate the flow of air and material to affect the amount and pattern of paint dispensed from the system.

The airless spray method atomizes paint through hydraulic pressure as it exits the spray nozzle. It does not utilize air like the conventional method and therefore uses only one hose to the nozzle. As the paint leaves the spray tip under high pressure, it atomizes into a fine spray. Airless spray units can be self-contained units relying on an internal pump or an external air compressor to develop the necessary fluid pressure. This method uses high pressures up to 4500 psi. Adjustments are limited to the tips used on the spray nozzle.

All specified coatings now in use, except the inorganic zincs, can be applied by any of the previously mentioned methods. The conventional method is preferred over the airless method. Spraying by conventional methods is the only satisfactory method for application of inorganic zinc. Zinc will mud crack if sprayed too thick. The airless method is best suited for large flat areas like girder webs. The airless method should be avoided when applying PWB 161/162 Aluminum Leafing due to undesirable finish results. Aluminum Leafing will be blotchy with non-uniform finish and color. Use of an agitating mixing pot is a must for the zinc and PWB 161/162 paint systems. Small holidays or skips which sometimes occur around rivets or bolts can be picked up with a brush, and areas inaccessible with a spray gun should be swabbed or brushed. Application of a stripe coat on steel edges, corners, seams, crevices and around rivets and bolts is critical and is a requirement noted in the specifications. These are the first areas to have corrosion issues if there is not adequate coating system thickness.

Coatings for use on structural steel, except inorganic zinc primer and moisture cure urethane, are manufactured ready for application and thinning is not necessary, nor should it be tolerated. Inorganic zinc primer and moisture cure urethane, may be thinned as recommended by the manufacturer.

Coatings applied to column casings follow the requirements of normal coatings systems application using the spray method. Except for limited areas inaccessible to spray application, the application of zinc rich primer using brush, dauber, or roller methods do not meet contract requirements.

Painting for appearance may be considered of secondary importance to painting for protection, but it is evident that the public is aware of bridge appearance. Both maximum protection and pleasing appearance can be achieved by a paint job properly done. The most common causes of poor appearance are runs or sags in the paint film and paint spray or splatters on the concrete portion of the structure. By using care and caution, it is far easier to prevent these defects than it is to correct them.

6 – Thickness of Paint Film

Each coating has a designed thickness that is listed in the *Contract Specifications* and it is paramount that verification of these values be performed.

Since wet coatings shrink when they dry, there are two basic methods to measure a coating application:

- Wet Film Thickness (WFT) is measured with a step gauge (non-electronic device) used by the painters during coating application to achieve a desired dry thickness.
- Dry Film Thickness (DFT) is measured when the coating is dry (electronic device) to verify that the specified thickness was achieved.

While there is an emphasis on the DFT test, as it is ultimately the acceptance test, it is the WFT test that will control the success of the application. The WFT of undercoats and finish coats will vary depending on the type of coating system applied. The estimated wet thickness is derived from a shrinkage factor (% volume solids) found within the Product Datasheet developed by the manufacturer. The wet film thickness can be easily checked using a pocket-sized wet film thickness gauge. Verify the WFT sporadically as the coating is being applied to determine if too much or too little coating is being applied. Consult with the SM&I Paint Coordinator or METS Chemistry Lab to obtain the WFT range for the coating system specified. The WFT is generally twice the DFT value but can vary slightly from this value.

The DFT of the coating system is generally specified by *Contract Specifications*. The frequency and location of DFT testing is determined by the *Contract Specifications* and is often but not always referred to the SSPC-PA-2 Standards. Appendix 1 of SSPC-PA-2 provides guidance on the testing of complex shapes but is not considered a mandatory part of the standard. The *Contract Specifications* allow for testing locations as selected by the Engineer.

Paint dry film thickness is measured by a type 2 magnetic dry film thickness gauge. Gauges are supplied by Structure Construction with instructions for their use. They use a measuring probe and the magnetic induction, hall-effect, and/or eddy current measurement principles in conjunction with an electronic microprocessor to produce a coating measurement. Type 2 gauges use both an integrated probe or a cable attached probe. These devices are delicate and expensive instruments and should, therefore, be handled with care. Gauges should not be stored near active electrical circuits, and they should not remain near welding equipment longer than absolutely necessary. Periodic checks to determine the accuracy of the gauge is necessary. These checks may be made by using the shims provided. All measurements should be taken with the gauge placed firmly at right angles to the area being measured; even a slight slanting of the device gives a high reading, as will lack of solid contact. Recalibrate gauges on different types and sizes of steel. Reading differences have been noted between webs, stiffeners and braces. Practice using the gauge to get familiar with the device. Periodically have the gauges calibrated by an authorized vendor through Structure Construction.

Each DFT Type 2 gauge must have the calibration verified and recorded prior to, and after, each shift of use. Steps to verify a DFT Type 2 gauge involve measuring a shim of a known thickness similar to your application. Measurements from the gauge are received from the highest peaks found within the blasting profile (See Figure 2, *Typical Gauge Position*); therefore, the verification of calibration should be performed on a similar substrate, with a similar blast profile. The gauge readings represent all the coatings that are currently applied to the base metal. Thus, reading the intermediate coat will include the thickness of the prime coat, plus the thickness of the intermediate coat. Methods of verifications are as follows:

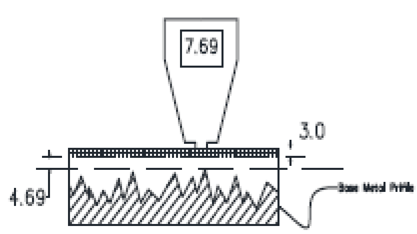

Figure 2. Typical Gauge Position

1. Make sure the DFT gauge probe is clean.
2. Review the manufacturer's method for verifying the calibration as there can be variations between makes and models.
3. Agree with the Contractor on a representative substrate to measure verification shims.
4. Use two shims to measure atop the representative substrate, one slightly less than the "combined" target thickness and one slightly greater than the "combined" target thickness. Take the average of 10 readings on each of the shims and adjust gauge as described by the manufacturer.
5. Retake readings on shims for verification. Readings should be +/- 3% of shim thickness.

On repainting projects take DFT readings on the existing paint system to obtain average baseline values for various points on the structure. Upon completion, take similar readings at or close to the initial locations. Obtaining accurate intermediate readings on these projects may be difficult as the exact same points may not be duplicated. Wet thickness gauges can be utilized with the DFT being roughly 50% of the wet film thickness.

On blast and paint or spot blast and paint contracts, take DFT readings at each stage of the operation. When painting over an existing coating system, take DFT readings on the existing coating to establish a DFT baseline.

The measuring of DFT's isn't always an exact science. Taking measurements over the course of multiple applications of coatings, on top of an existing coating system, can be challenging even if you are careful to measure at the same locations. Do not hesitate to take several measurements around the local area of interest to verify that the readings are accurate.

The importance of adequate paint film thickness cannot be overstressed. All other things being equal, it is one of the factors that determine the service life of a paint job. It follows, therefore, that sufficient measurements should be taken to assure specified thicknesses in all places.

7 – Protective Measures

Inherent in a bridge painting operation is the possibility of the creation of a nuisance, or of physical damage to adjacent property or to the traveling public. This is particularly true on contracts involving the repainting of structures over traffic. A containment system will most often be required on all projects to prevent the discharge of wash water and any blasting or paint debris. Check the contract Special Provisions for additional details.

Although the responsibility for the prevention of damage rests with the Contractor, the Structure Representative must constantly be aware of the job situation and should not hesitate to call the existence of hazards or potential sources of damage to the Contractor's attention.

In the event passing automobiles are spattered with paint, little damage will occur if the paint is immediately removed with a compatible solvent or with water for water-borne paints. However, this should not be a common occurrence. A prudent contractor will use protective devices such as drop cloths, screens, overhead tarps, and the like to adequately protect passing traffic or adjacent property.

Particular emphasis should be placed on the protection of concrete surfaces which are a part of the structure. The Contractor should not be allowed to mix paint or charge paint pots on bridge decks without adequate drop cloths. It is next to impossible to remove paint from concrete, and particular care should be exercised to prevent spattering such surfaces. After the paint is dry, the area should be rubbed with a stone and wire brushed, or lightly blast-cleaned.

The coating being sprayed can drift as much as a quarter mile or more, and contractors should be reminded of this possibility, particularly if automobiles are being parked nearby.

Ventilated containment systems may be necessary for the project and must comply with scaffolding specifications. A table summarizing the available bridge load capacity is usually provided in the *Contract Specifications*. Contact the designer if this is not provided. The containment system plans are submitted as action type submittals and reviewed by the Structure Representative. The specified concentrated loads in the *Contract Specifications* originate from the SM&I Paint Coordinator and account for typical equipment used in the cleaning and painting process.

When working with existing paint systems containing lead or other hazardous materials, a negative pressure containment system is utilized to control airborne lead particles and prevent their migration outside of the containment. In this setup, air flows into the containment and is filtered before being allowed to exit. This way no particles can exit the containment structure.

In general, the best protective measure is the anticipation of possible damage and prevention of its occurrence.

8 – Paint Records and Reports

The following forms must be completed and are used to keep paint records for each phase of cleaning and painting operations:

Form SC-4601, *Daily Clean and Paint Record*
Form SC-4807, *Spot-Sandblasting Report*
Form SC-6302, *Clean and Paint Cost Summary*
Form SC-6305, *Paint Record*

Per BCM C-6, *Required Documents to be Submitted During Construction,* Form SC-6305, *Paint Record*, must be submitted to SC HQ by email to **sc.office.associates@dot.ca.gov**, immediately after the structure is painted. Paint forms were developed to simplify the reporting of statistical data as well as to ensure uniformity in record keeping. Structure Representatives should be familiar with the use of these forms and should enter the required information on them.

In addition to the paint records, the Resident Engineer's and/or Assistant Resident Engineer's Daily Reports are required for the painting operation.

The blast-cleaning and paint record Form SC-4601, *Daily Clean and Paint Record*, is a diary form used by the Structure Representative for the various phases of the cleaning and painting work. These diaries have the same significance as a daily diary and therefore should receive the same degree of care in their preparation and distribution.

Form SC-4807, *Spot-Sandblasting Report*, is a record of spot blast cleaning performed. The purpose of this form is to have the Structure Representative and the Contractor's representative agree, on a daily basis, on the amount of spot blast cleaning that was performed.

On repainting projects, the Structure Representative will prepare, from the information gathered in the daily diaries, cost data for the various phases of blast-cleaning and painting. This data will be entered on the paint data sheets, Form SC-6302, *Clean and Paint Cost Summary*. Use of this form aids the Structure Representative in making a systematic and uniform record of cost data.

Following completion of the painting operation, statistical information included on the paint record sheets is summarized on Form SC-6305, *Paint Record*. The primary purpose of the information summarized on this form is to provide a sound basis for estimating the cost of future painting projects. This also provides information regarding the type and quantities of paint used, which may be used for future paint projects.

The forms in this section must be completed as the work progresses. Delays will result in the loss of information and a potentially large backlog of documents.

9 – Surface Area Computations

The area to be cleaned and coated is an important part of the paint inspection procedure. The surface area must be known to enable the Structure Representative to determine the true rate of progress and to calculate coverage rates. Surface area calculations are also of great value in the planning of future painting contracts. Surface areas of most structures are available in the Sacramento Structures Maintenance and Investigations (SM&I), which is within the Division of Maintenance. These records may also be available from the Designer or may be included in the Structure Resident Engineer's Pending File. If they are not available, it will be the responsibility of the Structure Representative assigned to the project to calculate them. All calculations should be clearly shown so they may be easily checked by another person. Include subtotals for each span and a separate summary sheet for each structure in the project.

Submit surface area computations with Form SC-6305, *Paint Record*, as an attachment to the Paint Record for future reference.

These surface area computations will assist the Structure Representative in completing the required as-built plan sheets at the completion of the project.

On request, charts to assist in the calculation of surface areas will be furnished to the project by SM&I.

10 – Payment

Before the painting operations begins, request a schedule of values for payment purposes on Lump Sum items from the Contractor.

Discuss with the designer how the spot blast and paint quantities were developed. It is good practice to track this quantity to monitor cumulative usage through the project to prevent overruns.

11 – As-Built Plan Sheets

The information that should be included on the as-built plan sheets includes:

1. The method of paint application: clean and paint, blast and paint, spot blast and paint or other combinations
2. The coating system utilized
3. The spot blast clean square feet area total
4. The average dry film thickness of the existing coating system after initial cleaning
5. The average dry film thickness of all coatings

6. The average of the applied paint thickness (total – initial)

The averages should represent large areas throughout the structure; for example if the structure is a simple four span bridge, it could be divided up into 4 locations. See Figure 4, *As-Built Plan Example*, for a sample of an as-built plan sheet.

12 – Coatings Used by the Department

The different types of coatings currently being used by the Department are identified and listed on the Authorized Materials List (AML) which can be found at the following links:

https://dot.ca.gov/programs/engineering-services/bridge-paint-pavement-striping-paints - is a list of the standard bridge paint coatings used by Structure Construction, as well as pavement striping paints used by the Department.

https://dot.ca.gov/-/media/dot-media/programs/engineering/documents/mets/inorganic-zinc-primer-a11y.pdf - is a list of approved inorganic zinc-rich primers, and

https://dot.ca.gov/-/media/dot-media/programs/engineering/documents/mets/organic-zinc-primer-a11y.pdf - is a list of approved organic zinc-rich primers.

No coating is to be used unless it is on the Departments AML or meets the specifications of the Department's standard coatings.

13 – Environmental Protection

Structure Construction must comply with regulations imposed by various public environmental protection agencies which operate statewide. The primary concerns of these agencies are air and water pollution as well as noise abatement.

Curtailment methods for dust and waste products include confinement within the immediate work area and use of abrasives which create less dust. Wet-blast cleaning may be another alternative, subject to authorization of the Engineer, and in conformance with the specifications.

Confinement of waste products and dust is accomplished by using an engineered containment system. The confined waste materials are then collected, tested, and hauled to an authorized waste handling facility by an authorized transporter.

Copper, silver, and nickel slags are sources of abrasives commonly used. These abrasives are more expensive than sand. All abrasives for dry, unconfined blasting including sand, must be approved by the Air Resources Board.

Lead pigmented paints are no longer being specified for use on structural steel because of their toxicity. However, lead pigmented paints may still be present on existing structures and proper precautions need to be taken when working around lead and other hazardous materials such as chromium. A site-specific safety plan is required when working around these systems. Refer to BCM B-2, *SC Lead Compliance Plan*, for additional information.

The appropriate Personal Protective Equipment (PPE) should be used, and respirators must be utilized, when working in an area where hazardous paints are being disturbed. See Chapter 12, *Personal Protective Equipment*, and Chapter 15, *Respiratory Protection Program*, of the Caltrans Safety Manual. Note that a physician's examination and fit testing is required for the use of half-face and full-face respirators. Lead Compliance Training must be completed prior to working on a bridge painting project where hazardous paints are present.

14 – How to Operate a Sling Psychrometer

There are different manually operated sling psychrometers available. They all operate under the same principle of determining wet and dry bulb temperatures as follows:

1. Inspect the instrument to verify:
    a. The cotton wick on the wet bulb is in good condition, in contact with the end of the bulb and not yellow or frayed.
    b. If the instrument utilizes a reservoir, that the reservoir holds water and the cap is in place.
    c. The thermometer body rotates freely around the handle.
2. Thoroughly saturate the wick with distilled water. Replace the wick if water beads up and does not soak in. For reservoir type units, fill the reservoir with distilled water.
3. Facing the wind, rotate the thermometer body around the handle at a steady rate.
4. At the one-minute mark, record both the wet and dry bulb temperatures.
5. Rotate the instrument for another minute and record both the wet and dry bulb temperatures.
6. If the temperatures have not changed, proceed to the next step. Otherwise continue until there are no changes. The goal is to take the readings once the thermometers have stabilized.
7. Determine Relative Humidity using the following method depending upon the psychrometer type:

a. Open Thermometer Type:

    i. Calculate the difference between the wet and dry bulb temperatures.

    ii. Use the Relative Humidity Table to interpolate the relative humidity value based upon the dry bulb temperature and calculated value.

b. Reservoir Type:

    i. Reset the temperature body back into the handle.

    ii. Slide the body until the wet temperature and dry temperature scales coincide.

    iii. Read the relative humidity value as indicated by the arrow on the lower scale.

15 – Typical Paint Kit Contents

SC assembles and issues paint kits to Structure Representatives for use in administering painting contracts. This kit typically includes the following, and may change due to supply:

1. Magnetic surface thermometer
2. Digital Thermometer
3. Hygrometer / Digital Psychrometer
4. Sling Psychrometer
5. Coating Thickness Gauge
6. Dial Thickness Gauge
7. Inspection Mirror
8. Surface Profile Tape
9. Soluble Salt Test Kit
10. Chloride Test Kit
11. Feeler Gauge
12. Guide and Reference Photos for Surface Preparation Book

The contents of the kit include instruments that will need periodic calibration and consumables that need to be replaced as needed. Please contact SC Headquarters to coordinate calibration and for restocking of consumables.

Additionally, the following tools are recommended:

1. Dull putty knife for scraping loose paint.

2. Chalk or soapstone to mark structural steel.
3. Painter’s tape for marking surfaces.

Information shown is approximate only and not to scale. Compiled from records of existing bridges on the State Highway System.

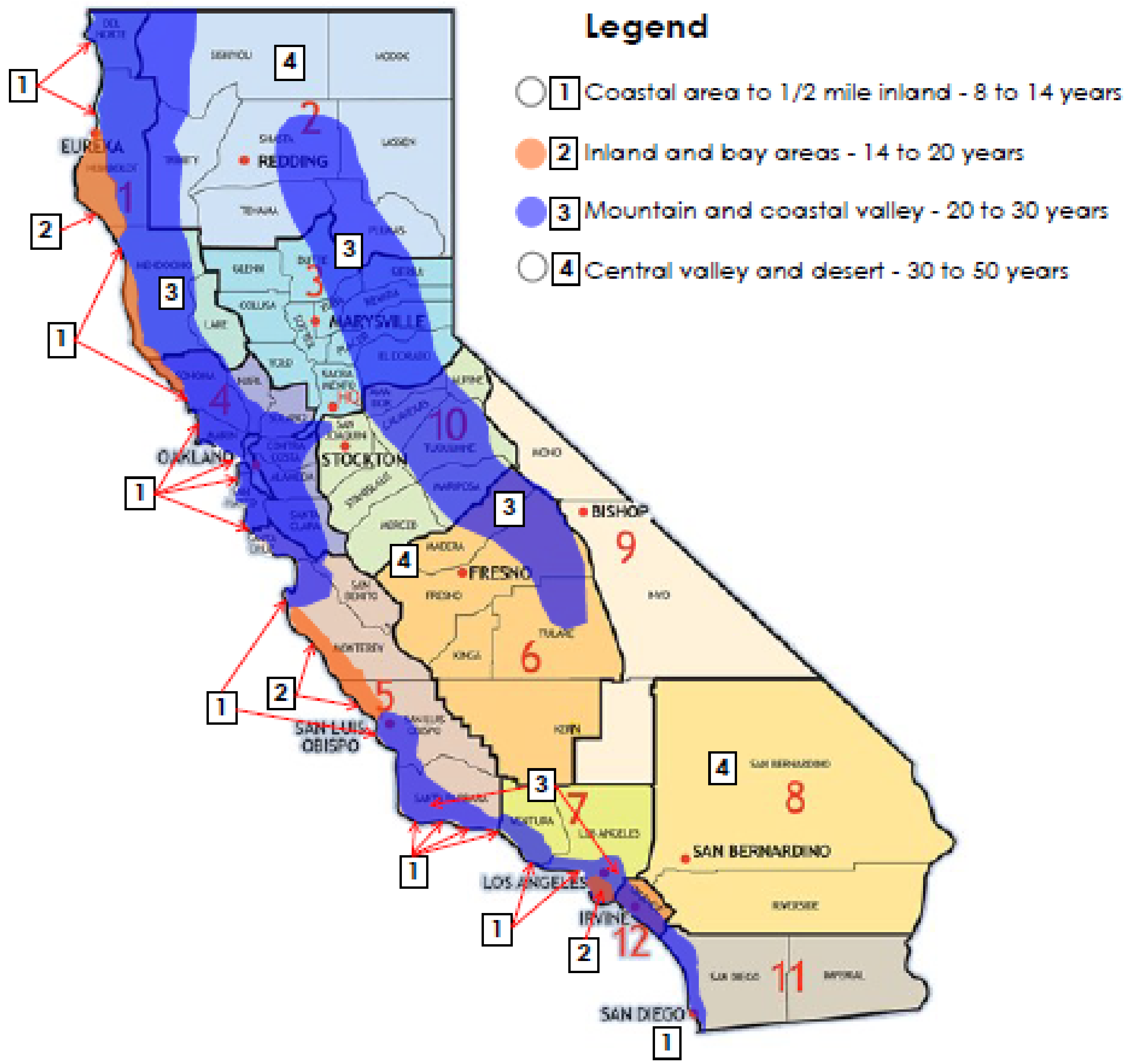

Figure 3. Paint Service Life on Structural Steel Bridges

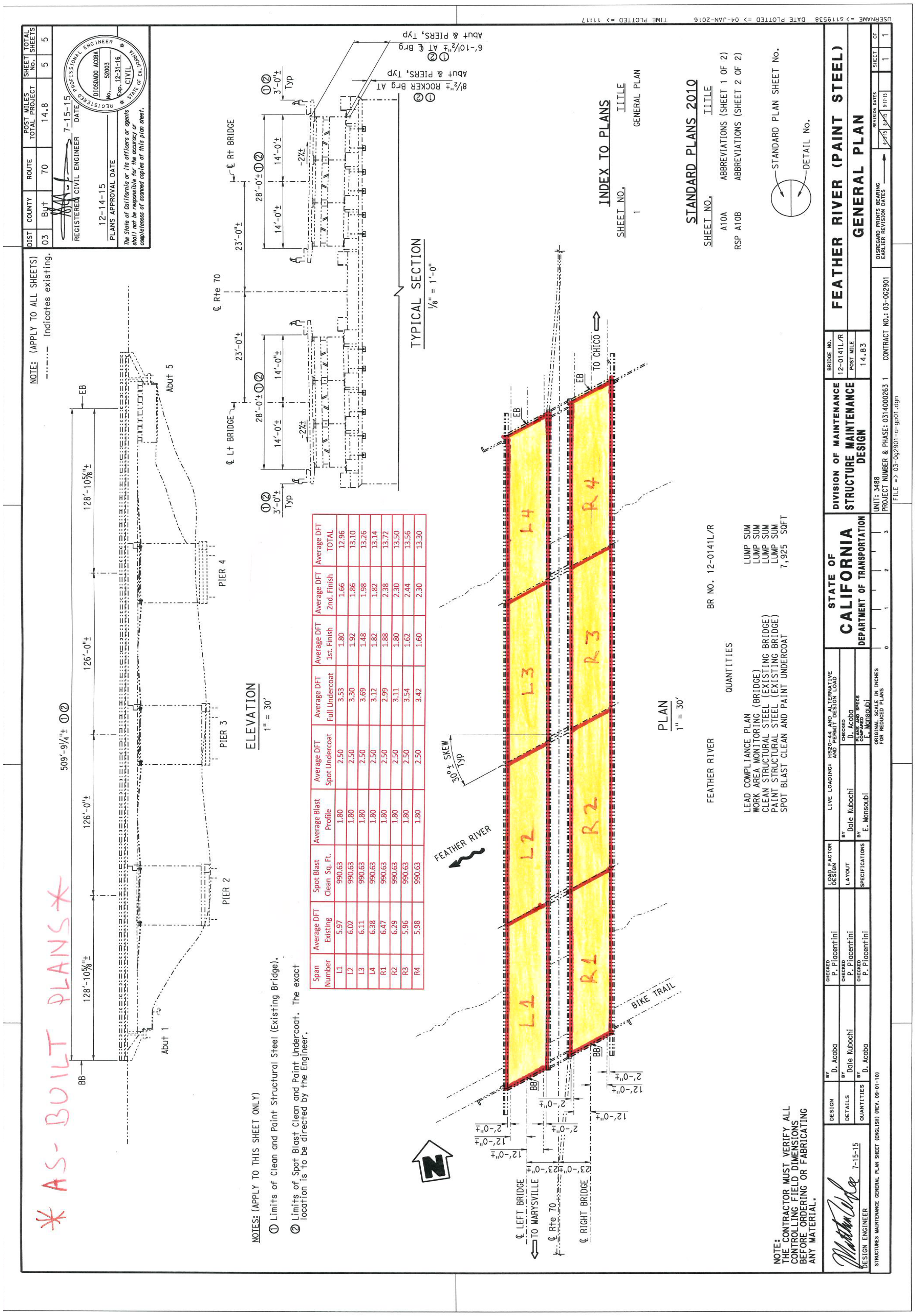

Figure 4. As-Built Plan Example